Exam Summary (GATE 2017 Set 2)

Total Questions:	65 (30 + 35)	Qs. Attempted:	56 (30 + 26)	Correct Marks:	71 (29 + 42)
Total Marks:	100 (30 + 70)	Correct Attempts:	50 (29 + 21)	Penalty Marks:	1.33 (0 + 1.33)
Exam Duration:	180 Minutes	Incorrect Attempts:	6 (1 + 5)	Resultant Marks:	69.66 (29 + 40.66)
				Time Taken:	180 Minutes

Exam Response   Exam Stats   Feedback

Aptitude

Q.1. Multiple Choice Type   Award: 1   Penalty: 0.33   Verbal Aptitude

Choose the option with words that are not synonyms.

  A. aversion, dislike
  B. luminous, radiant
  C. plunder, loot
  D. yielding, resistant

Your Answer: D   Correct Answer: D   Correct   Discuss

Q.2. Multiple Choice Type   Award: 1   Penalty: 0.33   Verbal Aptitude

Saturn is _____ to be seen on a clear night with the naked eye.

  A. enough bright
  B. bright enough
  C. as enough bright
  D. bright as enough

Your Answer: B   Correct Answer: B   Correct   Discuss

Q.3. Multiple Choice Type   Award: 1   Penalty: 0.33   Analytical Aptitude

There are five buildings called V, W, X, Y and Z in a row (not necessarily in that order). V is to the West of W. Z is to the East of X and the West of V. W is to the West of Y. Which is the building in the middle?

  A. V
  B. W
  C. X
  D. Y

Your Answer: A   Correct Answer: A   Correct   Discuss

Q.4. Multiple Choice Type   Award: 1   Penalty: 0.33   Quantitative Aptitude

A test has twenty questions worth 100 marks in total. There are two types of questions. Multiple choice questions worth 3 marks each and essay questions are worth 11 marks each. How many multiple choice questions does the exam have?

A. 12
B. 15
C. 18
D. 19

Your Answer: B | Correct Answer: B | Correct | Discuss

Q.5. | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Quantitative Aptitude

There are 3 red socks, 4 green socks and 3 blue socks. You choose 2 socks. The probability that they are of the same colour is

A. $\dfrac{1}{5}$

B. $\dfrac{7}{30}$

C. $\dfrac{1}{4}$

D. $\dfrac{4}{15}$

Your Answer: D | Correct Answer: D | Correct | Discuss

Q.6. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Verbal Aptitude

"We lived in a culture that denied any merit to literary works, considering them important only when they were handmaidens to something seemingly more urgent – namely ideology. This was a country where all gestures, even the most private, were interpreted in political terms."

The author's belief that ideology is not as important as literature is revealed by the word:

A. 'culture'
B. 'seemingly'
C. 'urgent'
D. 'political'

Your Answer: D | Correct Answer: B | Incorrect | Discuss

Q.7. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Analytical Aptitude

There are three boxes. One contains apples, another contains oranges and the last one contains both apples and oranges. All three are known to be incorrectly labeled. If you are permitted to open just one box and then pull out and inspect only one fruit, which box would you open to determine the contents of all three boxes?

A. The box labeled 'Apples'
B. The box labeled 'Apples and Oranges'
C. The box labeled 'Oranges'
D. Cannot be determined

Your Answer: | Correct Answer: B | Not Attempted | Discuss

Multiple Choice Type | Award: 2 | Penalty: 0.67 | Quantitative Aptitude

X is a 30 digit number starting with the digit 4 followed by the digit 7. Then the number X^3 will have

A. 90 digits
B. 91 digits
C. 92 digits
D. 93 digits

Your Answer: | Correct Answer: A | Not Attempted | Discuss

Q.9. Multiple Choice Type | Award: 2 | Penalty: 0.67 | Quantitative Aptitude

The number of roots of $e^x + 0.5x^2 - 2 = 0$ in the range $[-5, 5]$ is

A. 0
B. 1
C. 2
D. 3

Your Answer: | Correct Answer: C | Not Attempted | Discuss

Q.10. Multiple Choice Type | Award: 2 | Penalty: 0.67 | Quantitative Aptitude

An air pressure contour line joins locations in a region having the same atmospheric pressure. The following is an air pressure contour plot of a geographical region. Contour lines are shown at 0.05 bar intervals in this plot.

If the possibility of a thunderstorm is given by how fast air pressure rises or drops over a region, which of the following regions is most likely to have a thunderstorm?
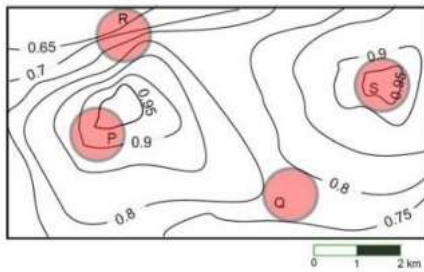
A. P
B. Q
C. R
D. S

Your Answer: | Correct Answer: C | Not Attempted | Discuss

Technical

Q.1. Multiple Choice Type | Award: 1 | Penalty: 0.33 | Digital Logic

The representation of the value of a 16-bit unsigned integer X in hexadecimal number system is BCA9. The representation of the value of X in octal number system is

A. 571244

B. 736251
571247
136251

Q.2. Multiple Choice Type Award: 1 Penalty: 0.33 Programming

Match the following:

$P.$	static char var ;	i.	Sequence of memory locations to store addresses
$Q.$	m = malloc(10); m =NULL ;	ii.	A variable located in data section of memory
$R.$	char *ptr[10] ;	iii.	Request to allocate a CPU register to store data
$S.$	register int varl;	iv.	A lost memory which cannot be freed

A. P-ii; Q-iv; R-i; S-iii
B. P-ii; Q-i; R-iv; S-iii
C. P-ii; Q-iv; R-iii; S-i
D. P-iii; Q-iv; R-i; S-ii

Q.3. Multiple Choice Type Award: 1 Penalty: 0.33 Algorithms

Match the algorithms with their time complexities:

Algorithms	Time Complexity
P. Tower of Hanoi with n disks	i. $\Theta(n^2)$
Q. Binary Search given n sorted numbers	ii. $\Theta(n \log n)$
R. Heap sort given n numbers at the worst case	iii. $\Theta(2^n)$
S. Addition of two $n \times n$ matrices	iv. $\Theta(\log n)$

A. $P \to (iii)$ $Q \to (iv)$ $r \to (i)$ $S \to (ii)$
B. $P \to (iv)$ $Q \to (iii)$ $r \to (i)$ $S \to (ii)$
C. $P \to (iii)$ $Q \to (iv)$ $r \to (ii)$ $S \to (i)$
D. $P \to (iv)$ $Q \to (iii)$ $r \to (ii)$ $S \to (i)$

Q.4. Multiple Choice Type Award: 1 Penalty: 0.33 Theory of Computation

Let L_1, L_2 be any two context-free languages and R be any regular language. Then which of the following is/are CORRECT?

I. $L_1 \cup L_2$ is context-free
II. $\overline{L_1}$ is context-free
III. $L_1 - R$ is context-free
IV. $L_1 \cap L_2$ is context-free

A. I, II and IV only
B. I and III only
C. II and IV only
D. I only

Multiple Choice Type | Award: 1 | Penalty: 0.33 | Compiler Design

Match the following according to input (from the left column) to the compiler phase (in the right column) that processes it:

P. Syntax tree	i. Code generator
Q. Character stream	ii. Syntax analyser
R. Intermediate representation	iii. Semantic analyser
S. Token stream	iv. Lexical analyser

A. P-ii; Q-iii; R-iv; S-i
B. P-ii; Q-i; R-iii; S-iv
C. P-iii; Q-iv; R-i; S-ii
D. P-i; Q-iv; R-ii; S-iii

Your Answer: C | Correct Answer: C | Correct | Discuss

Q.6. Multiple Choice Type | Award: 1 | Penalty: 0.33 | Compiler Design

Which of the following statements about parser is/are CORRECT?

I. Canonical LR is more powerful than SLR
II. SLR is more powerful than LALR
III. SLR is more powerful than Canonical LR

A. I only
B. II only
C. III only
D. II and III only

Your Answer: A | Correct Answer: A | Correct | Discuss

Q.7. Multiple Choice Type | Award: 1 | Penalty: 0.33 | Operating System

Which of the following is/are shared by all the threads in a process?

I. Program counter
II. Stack
III. Address space
IV. Registers

A. (I) and (II) only
B. (III) only
C. (IV) only
D. (III) and (IV) only

Your Answer: B | Correct Answer: B | Correct | Discuss

Q.8. Multiple Choice Type | Award: 1 | Penalty: 0.33 | Operating System

In a file allocation system, which of the following allocation scheme(s) can be used if no external fragmentation is allowed?

1. Contiguous
2. Linked
3. Indexed

A. 1 and 3 only

2 only

3 only

D. 2 and 3 only

Your Answer: D   Correct Answer: D   Correct   Discuss

Q.9. Multiple Choice Type   Award: 1   Penalty: 0.33   Computer Networks

Consider the following statements about the routing protocols. Routing Information Protocol (RIP) and Open Shortest Path First (OSPF) in an **IPv4** network.

   I. RIP uses distance vector routing
  II. RIP packets are sent using UDP
  III. OSPF packets are sent using TCP
  IV. OSPF operation is based on link-state routing

Which of the above statements are CORRECT?

  A. I and IV only
  B. I, II and III only
  C. I, II and IV only
  D. II, III and IV only

Your Answer: C   Correct Answer: C   Correct   Discuss

Q.10. Multiple Choice Type   Award: 1   Penalty: 0.33   Calculus

If $f(x) = R\, \sin(\frac{\pi x}{2}) + S$, $f'\left(\frac{1}{2}\right) = \sqrt{2}$ and $\int_0^1 f(x)dx = \frac{2R}{\pi}$, then the constants R and S are

A. $\frac{2}{\pi}$ and $\frac{16}{\pi}$
B. $\frac{2}{\pi}$ and 0
C. $\frac{4}{\pi}$ and 0
D. $\frac{4}{\pi}$ and $\frac{16}{\pi}$

Your Answer: C   Correct Answer: C   Correct   Discuss

Q.11. Multiple Choice Type   Award: 1   Penalty: 0.33   Mathematical Logic

Let p, q, r denote the statements "*It is raining*", "*It is cold*", and "*It is pleasant*", respectively. Then the statement "*It is not raining and it is pleasant, and it is not pleasant only if it is raining and it is cold*" is represented by

A. $(\neg p \wedge r) \wedge (\neg r \to (p \wedge q))$
B. $(\neg p \wedge r) \wedge ((p \wedge q) \to \neg r)$
C. $(\neg p \wedge r) \vee ((p \wedge q) \to \neg r)$
D. $(\neg p \wedge r) \vee (r \to (p \wedge q))$

Your Answer: A   Correct Answer: A   Correct   Discuss

Q.12. Multiple Choice Type   Award: 1   Penalty: 0.33   Digital Logic

Given the following binary number in 32-bit (single precision) IEEE-754 format :

00111110011011010000000000000000

The decimal value closest to this floating-point number is :

A. $1.45 * 10^1$

B. $1.45 * 10^{-1}$

C. $2.27 * 10^{-1}$

D. $2.27 * 10^1$

Your Answer: C | Correct Answer: C | Correct | Discuss

Q.13. | Multiple Choice Type | Award: 1 | Penalty: 0.33 | DS

A circular queue has been implemented using a singly linked list where each node consists of a value and a single pointer pointing to the next node. We maintain exactly two external pointers FRONT and REAR pointing to the front node and the rear node of the queue, respectively. Which of the following statements is/are CORRECT for such a circular queue, so that insertion and deletion operations can be performed in $O(1)$ time?

I. Next pointer of front node points to the rear node.
II. Next pointer of rear node points to the front node.

A. (I) only.
B. (II) only.
C. Both (I) and (II).
D. Neither (I) nor (II).

Your Answer: B | Correct Answer: B | Correct | Discuss

Q.14. | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Algorithms

Consider the following function implemented in C:

```c
void printxy(int x, int y) {
    int *ptr;
    x=0;
    ptr=&x;
    y=*ptr;
    *ptr=1;
    printf("%d, %d", x, y);
}
```

The output of invoking $printxy(1, 1)$ is:

A. $0, 0$
B. $0, 1$
C. $1, 0$
D. $1, 1$

Your Answer: C | Correct Answer: C | Correct | Discuss

Q.15. | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Algorithms

The Breadth First Search (BFS) algorithm has been implemented using the queue data structure. Which one of the following is a possible order of visiting the nodes in the graph below?

A. MNOPQR
B. NQMPOR

C. QMNROP
POQNMR

Print
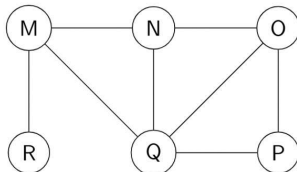
Q.16.   Multiple Choice Type   Award: 1   Penalty: 0.33   Theory of Computation

Identify the language generated by the following grammar, where S is the start variable.

- $S \rightarrow XY$
- $X \rightarrow aX \mid a$
- $Y \rightarrow aYb \mid \epsilon$

A. $\{a^m b^n \mid m \geq n, n > 0\}$
B. $\{a^m b^n \mid m \geq n, n \geq 0\}$
C. $\{a^m b^n \mid m > n, n \geq 0\}$
D. $\{a^m b^n \mid m > n, n > 0\}$

Q.17.   Multiple Choice Type   Award: 1   Penalty: 0.33   Databases

An ER model of a database consists of entity types A and B. These are connected by a relationship R which does not have its own attribute. Under which one of the following conditions, can the relational table for R be merged with that of A?

A. Relationship R is one-to-many and the participation of A in R is total
B. Relationship R is one-to-many and the participation of A in R is partial
C. Relationship R is many-to-one and the participation of A in R is total
D. Relationship R is many-to-one and the participation of A in R is partial

Q.18.   Multiple Choice Type   Award: 1   Penalty: 0.33   Computer Networks

Consider socket API on a Linux machine that supports connected UDP sockets. A connected UDP socket is a UDP socket on which *connect* function has already been called. Which of the following statements is/are CORRECT?

I. A connected UDP socket can be used to communicate with multiple peers simultaneously.
II. A process can successfully call *connect* function again for an already connected UDP socket.

A. I only
B. II only
C. Both I and II
D. Neither I nor II

Q.19.   Numerical Type   Award: 1   Penalty: 0   Databases

Consider the following tables $T1$ and $T2$.

T1

P	Q
2	2
3	8
7	3
5	8
6	9
8	5
9	8

T2

R	S
2	2
8	3
3	2
9	7
5	7
7	2

In table $T1$ **P** is the primary key and **Q** is the foreign key referencing **R** in table $T2$ with on-delete cascade and on-update cascade. In table $T2$, **R** is the primary key and **S** is the foreign key referencing **P** in table $T1$ with on-delete set NULL and on-update cascade. In order to delete record $\langle 3, 8 \rangle$ from the table $T1$, the number of additional records that need to be deleted from table $T1$ is _____

Your Answer: 0 | Correct Answer: 0.00 | Correct | Discuss

Q.20. | Numerical Type | Award: 1 | Penalty: 0 | Computer Networks
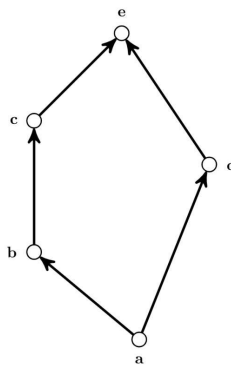
The maximum number of **IPv4** router addresses that can be listed in the record route (RR) option field of an **IPv4** header is_____.

Your Answer: 9 | Correct Answer: 9 | Correct | Discuss

Q.21. | Numerical Type | Award: 1 | Penalty: 0 | Set Theory & Algebra

Consider the set $X = \{a, b, c, d, e\}$ under partial ordering
$R = \{(a, a), (a, b), (a, c), (a, d), (a, e), (b, b), (b, c), (b, e), (c, c), (c, e), (d, d), (d, e), (e, e)\}$

The Hasse diagram of the partial order (X, R) is shown below.

The minimum number of ordered pairs that need to be added to R to make (X, R) a lattice is _____

Your Answer: 2 | Correct Answer: 0 | Incorrect | Discuss

Q.22. | Numerical Type | Award: 1 | Penalty: 0 | Linear Algebra

Let $P = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$ and $Q = \begin{bmatrix} -1 & -2 & -1 \\ 6 & 12 & 6 \\ 5 & 10 & 5 \end{bmatrix}$ be two matrices. Then the rank of $P + Q$ is _____ .

Your Answer: 2 | Correct Answer: 2 | Correct | Discuss

Q.23. | Numerical Type | Award: 1 | Penalty: 0 | Graph Theory

G is an undirected graph with n vertices and 25 edges such that each vertex of G has degree at least 3. Then the

um possible value of n is _____ .

Your Answer: 16   Correct Answer: 16   Correct   Discuss

Q.24.   Numerical Type   Award: 1   Penalty: 0   Set Theory & Algebra

Consider the quadratic equation $x^2 - 13x + 36 = 0$ with coefficients in a base b. The solutions of this equation in the same base b are $x = 5$ and $x = 6$. Then $b =$ ____

Your Answer: 8   Correct Answer: 8   Correct   Discuss

Q.25.   Numerical Type   Award: 1   Penalty: 0   Theory of Computation

The minimum possible number of states of a deterministic finite automaton that accepts the regular language L = $\{w_1 a w_2 \mid w_1, w_2 \in \{a, b\}^*, |w_1| = 2, |w_2| \geq 3\}$ is _____ .

Your Answer: 8   Correct Answer: 8   Correct   Discuss

Q.26.   Multiple Choice Type   Award: 2   Penalty: 0.67   Probability

P and Q are considering to apply for a job. The probability that P applies for the job is $\frac{1}{4}$, the probability that P applies for the job given that Q applies for the job is $\frac{1}{2}$, and the probability that Q applies for the job given that P applies for the job is $\frac{1}{3}$. Then the probability that P does not apply for the job given that Q does not apply for this job is

A. $\left(\dfrac{4}{5}\right)$

B. $\left(\dfrac{5}{6}\right)$

C. $\left(\dfrac{7}{8}\right)$

D. $\left(\dfrac{11}{12}\right)$

Your Answer: A   Correct Answer: A   Correct   Discuss

Q.27.   Multiple Choice Type   Award: 2   Penalty: 0.67   Digital Logic

If w, x, y, z are Boolean variables, then which one of the following is INCORRECT?

A. $wx + w(x + y) + x(x + y) = x + wy$

B. $\overline{wx}(y + \bar{z}) + \bar{w}x = \bar{w} + x + \bar{y}z$

C. $(w\bar{x}(y + x\bar{z}) + \bar{w}\bar{x})y = x\bar{y}$

D. $(w + y)(wxy + wyz) = wxy + wyz$

Your Answer: C   Correct Answer: C   Correct   Discuss

Q.28.   Multiple Choice Type   Award: 2   Penalty: 0.67   Digital Logic

Given $f(w, x, y, z) = \Sigma_m(0, 1, 2, 3, 7, 8, 10) + \Sigma_d(5, 6, 11, 15)$; where d represents the '*don't-care*' condition in Karnaugh maps. Which of the following is a minimum product-of-sums (POS) form of $f(w, x, y, z)$?

A. $f = (\bar{w} + \bar{z})(\bar{x} + z)$

$f = (\bar{w} + z)(x + z)$

C. $f = (w + z)(\bar{x} + z)$

D. $f = (w + \bar{z})(\bar{x} + z)$

Your Answer: A | Correct Answer: A | Correct | Discuss

Q.29. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | CO and Architecture

In a two-level cache system, the access times of L_1 and L_2 caches are 1 and 8 clock cycles, respectively. The miss penalty from the L_2 cache to main memory is 18 clock cycles. The miss rate of L_1 cache is twice that of L_2. The average memory access time (AMAT) of this cache system is 2 cycles. The miss rates of L_1 and L_2 respectively are

A. 0.111 and 0.056

B. 0.056 and 0.111

C. 0.0892 and 0.1784

D. 0.1784 and 0.0892

Your Answer: | Correct Answer: A | Not Attempted | Discuss

Q.30. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Algorithms

Consider the recurrence function

$$T(n) = \begin{cases} 2T(\sqrt{n}) + 1, & n > 2 \\ 2, & 0 < n \leq 2 \end{cases}$$

Then $T(n)$ in terms of Θ notation is

A. $\Theta(\log \log n)$

B. $\Theta(\log n)$

C. $\Theta(\sqrt{n})$

D. $\Theta(n)$

Your Answer: | Correct Answer: B | Not Attempted | Discuss

Q.31. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Probability

For any discrete random variable X, with probability mass function

$P(X = j) = p_j, p_j \geq 0, j \in \{0, \ldots, N\}$, and $\Sigma_{j=0}^{N} p_j = 1$, define the polynomial function $g_x(z) = \Sigma_{j=0}^{N} p_j z^j$. For a certain discrete random variable Y, there exists a scalar $\beta \in [0, 1]$ such that $g_y(z) = (1 - \beta + \beta z)^N$. The expectation of Y is

A. $N\beta(1 - \beta)$

B. $N\beta$

C. $N(1 - \beta)$

D. Not expressible in terms of N and β alone

Your Answer: B | Correct Answer: B | Correct | Discuss

Q.32. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Compiler Design

Consider the following expression grammar G:

- $E \rightarrow E - T \mid T$

- $T \to T + F \mid F$

$F \to (E) \mid id$

Which of the following grammars is not left recursive, but is equivalent to G?

A. $E \to E - T \mid T$

$T \to T + F \mid F$

$F \to (E) \mid id$

B. $E \to TE'$

$E' \to -TE' \mid \epsilon$

$T \to T + F \mid F$

$F \to (E) \mid id$

C. $E \to TX$

$X \to -TX \mid \epsilon$

$T \to FY$

$Y \to +FY \mid \epsilon$

$F \to (E) \mid id$

D. $E \to TX \mid (TX)$

$X \to -TX \mid +TX \mid \epsilon$

$T \to id$

Your Answer: C   Correct Answer: C   Correct   Discuss

Q.33. Multiple Choice Type   Award: 2   Penalty: 0.67   Operating System

A system shares 9 tape drives. The current allocation and maximum requirement of tape drives for that processes are shown below:

Process	Current Allocation	Maximum Requirement
P1	3	7
P2	1	6
P3	3	5

Which of the following best describes current state of the system?

A. Safe, Deadlocked
B. Safe, Not Deadlocked
C. Not Safe, Deadlocked
D. Not Safe, Not Deadlocked

Your Answer: B   Correct Answer: B   Correct   Discuss

Q.34. Multiple Choice Type   Award: 2   Penalty: 0.67   Digital Logic

Consider the binary code that consists of only four valid codewords as given below:

$00000, 01011, 10101, 11110$

Let the minimum Hamming distance of the code p and the maximum number of erroneous bits that can be corrected by the code be q. Then the values of p and q are

A. $p = 3$ and $q = 1$

B. $p = 3$ and $q = 2$

$p = 4$ and $q = 1$

$p = 4$ and $q = 2$

Your Answer: | Correct Answer: A | Not Attempted | Discuss

Q.35. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Computer Networks

Consider two hosts X and Y, connected by a single direct link of rate 10^6 bits/sec. The distance between the two hosts is $10,000$ km and the propagation speed along the link is 2×10^8 m/sec. Host X sends a file of $50,000$ bytes as one large message to host Y continuously. Let the transmission and propagation delays be p milliseconds and q milliseconds respectively. Then the value of p and q are

A. $p = 50$ and $q = 100$
B. $p = 50$ and $q = 400$
C. $p = 100$ and $q = 50$
D. $p = 400$ and $q = 50$

Your Answer: D | Correct Answer: D | Correct | Discuss

Q.36. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | DS

The pre-order traversal of a binary search tree is given by $12, 8, 6, 2, 7, 9, 10, 16, 15, 19, 17, 20$. Then the post-order traversal of this tree is

A. $2, 6, 7, 8, 9, 10, 12, 15, 16, 17, 19, 20$
B. $2, 7, 6, 10, 9, 8, 15, 17, 20, 19, 16, 12$
C. $7, 2, 6, 8, 9, 10, 20, 17, 19, 15, 16, 12$
D. $7, 6, 2, 10, 9, 8, 15, 16, 17, 20, 19, 12$

Your Answer: B | Correct Answer: B | Correct | Discuss

Q.37. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Programming

Consider the C program fragment below which is meant to divide x by y using repeated subtractions. The variables x, y, q and r are all unsigned int.

```
while (r >= y) {
    r=r-y;
    q=q+1;
}
```

Which of the following conditions on the variables x, y, q and r before the execution of the fragment will ensure that the loop terminated in a state satisfying the condition $x == (y * q + r)$?

A. $(q == r)$ && $(r == 0)$
B. $(x > 0)$ && $(r == x)$ && $(y > 0)$
C. $(q == 0)$ && $(r == x)$ && $(y > 0)$
D. $(q == 0)$ && $(y > 0)$

Your Answer: C | Correct Answer: C | Correct | Discuss

Q.38. | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Algorithms

Consider the following C function

```c
int fun(int n) {
    int i, j;
    for(i=1; i<=n; i++) {
        for (j=1; j<n; j+=i) {
            printf("%d %d", i, j);
        }
    }
}
```

Time complexity of fun in terms of Θ notation is

A. $\Theta(n\sqrt{n})$
B. $\Theta(n^2)$
C. $\Theta(n \log n)$
D. $\Theta(n^2 \log n)$

Your Answer: C | Correct Answer: C | Correct | Discuss

Q.39. Multiple Choice Type | Award: 2 | Penalty: 0.67 | Theory of Computation

Let δ denote the transition function and $\hat{\delta}$ denote the extended transition function of the ϵ-NFA whose transition table is given below:

δ	ϵ	a	b
$\to q_0$	$\{q_2\}$	$\{q_1\}$	$\{q_0\}$
q_1	$\{q_2\}$	$\{q_2\}$	$\{q_3\}$
q_2	$\{q_0\}$	$\emptyset$	$\emptyset$
q_3	$\emptyset$	$\emptyset$	$\{q_2\}$

Then $\hat{\delta}(q_2, aba)$ is

A. $\emptyset$
B. $\{q_0, q_1, q_3\}$
C. $\{q_0, q_1, q_2\}$
D. $\{q_0, q_2, q_3\}$

Your Answer: B | Correct Answer: C | Incorrect | Discuss

Q.40. Multiple Choice Type | Award: 2 | Penalty: 0.67 | Theory of Computation

Consider the following languages.

- $L_1 = \{a^p \mid p \text{ is a prime number}\}$
- $L_2 = \{a^n b^m c^{2m} \mid n \geq 0, m \geq 0\}$
- $L_3 = \{a^n b^n c^{2n} \mid n \geq 0\}$
- $L_4 = \{a^n b^n \mid n \geq 1\}$

Which of the following are CORRECT?

I. L_1 is context free but not regular
II. L_2 is not context free
III. L_3 is not context free but recursive
IV. L_4 is deterministic context free

A. I, II and IV only
B. II and III only
C. I and IV only
D. III and IV only

Your Answer: D | Correct Answer: D | Correct | Discuss

Let $L(R)$ be the language represented by regular expression R. Let $L(G)$ be the language generated by a context free grammar G. Let $L(M)$ be the language accepted by a Turing machine M. Which of the following decision problems are undecidable?

I. Given a regular expression R and a string w, is $w \in L(R)$?

II. Given a context-free grammar G, is $L(G) = \emptyset$

III. Given a context-free grammar G, is $L(G) = \Sigma^*$ for some alphabet Σ?

IV. Given a Turing machine M and a string w, is $w \in L(M)$?

A. I and IV only

B. II and III only

C. II, III and IV only

D. III and IV only

Your Answer: D | Correct Answer: D | Correct | Discuss

Q.42. Multiple Choice Type | Award: 2 | Penalty: 0.67 | Digital Logic

The next state table of a 2–bit saturating up-counter is given below.

Q_1	Q_0	Q_1^+	Q_0^+
0	0	0	1
0	1	1	0
1	0	1	1
1	1	1	1

The counter is built as a synchronous sequential circuit using T flip-flops. The expressions for T_1 and T_0 are

A. $T_1 = Q_1 Q_0, \quad T_0 = \bar{Q}_1 \bar{Q}_0$

B. $T_1 = \bar{Q}_1 Q_0, \quad T_0 = \bar{Q}_1 + \bar{Q}_0$

C. $T_1 = Q_1 + Q_0, \quad T_0 = \bar{Q}_1 \bar{Q}_0$

D. $T_1 = \bar{Q}_1 Q_0, \quad T_0 = Q_1 + Q_0$

Your Answer: B | Correct Answer: B | Correct | Discuss

Q.43. Numerical Type | Award: 2 | Penalty: 0 | Programming

Consider the following snippet of a C program. Assume that swap $(\&x, \&y)$ exchanges the content of x and y:

```
int main () {
    int array[] = {3, 5, 1, 4, 6, 2};
    int done =0;
    int i;
    while (done==0) {
        done =1;
        for (i=0; i<=4; i++) {
            if (array[i] < array[i+1]) {
                swap(&array[i], &array[i+1]);
                done=0;
            }
        }
        for (i=5; i>=1; i--) {
            if (array[i] > array[i-1]) {
                swap(&array[i], &array[i-1]);
                done =0;
            }
        }
    }
    printf("%d", array[3]);
}
```

The output of the program is _____

Your Answer: 3   Correct Answer: 3   Correct   Discuss

Q.44. Numerical Type   Award: 2   Penalty: 0   Databases

Two transactions T_1 and T_2 are given as $T_1 : r_1(X)w_1(X)r_1(Y)w_1(Y)$ $T_2 : r_2(Y)w_2(Y)r_2(Z)w_2(Z)$ where $r_i(V)$ denotes a *read* operation by transaction T_i on a variable V and $w_i(V)$ denotes a *write* operation by transaction T_i on a variable V. The total number of conflict serializable schedules that can be formed by T_1 and T_2 is _____

Your Answer: 6   Correct Answer: 54   Incorrect   Discuss

Q.45. Numerical Type   Award: 2   Penalty: 0   CO and Architecture

The read access times and the hit ratios for different caches in a memory hierarchy are as given below:

Cache	Read access time (in nanoseconds)	Hit ratio
I-cache	2	0.8
D-cache	2	0.9
$L2$-cache	8	0.9

The read access time of main memory in 90 nanoseconds. Assume that the caches use the referred-word-first read policy and the write-back policy. Assume that all the caches are direct mapped caches. Assume that the dirty bit is always 0 for all the blocks in the caches. In execution of a program, 60% of memory reads are for instruction fetch and 40% are for memory operand fetch. The average read access time in nanoseconds (up to 2 decimal places) is _____

Your Answer: Correct Answer: 4.7 : 4.8   Not Attempted   Discuss

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Q.46. Numerical Type   Award: 2   Penalty: 0   Databases

Consider the following database table named top_scorer.

player	country	goals
Klose	Germany	16
Ronaldo	Brazil	15
G Muller	Germany	14
Fontaine	France	13
Pele	Brazil	12
Klinsmann	Germany	11
Kocsis	Hungary	11
Batistuta	Argentina	10
Cubillas	Peru	10
Lato	Poland	10
Lineker	England	10
T Muller	Germany	10
Rahn	Germany	10

Consider the following SQL query:

```
    SELECT ta.player FROM top_scorer AS ta
    WHERE ta.goals >ALL (SELECT tb.goals
        FROM top_scorer AS tb
        WHERE tb.country = 'Spain')
5. AND ta.goals > ANY (SELECT tc.goals
        FROM top_scorer AS tc
        WHERE tc.country='Germany')
```

The number of tuples returned by the above SQL query is _____

Your Answer: 7   Correct Answer: 7   Correct   Discuss

Q.47. Numerical Type   Award: 2   Penalty: 0   Combinatory

If the ordinary generating function of a sequence $\{a_n\}_{n=0}^{\infty}$ is $\frac{1+z}{(1-z)^3}$, then $a_3 - a_0$ is equal to _____ .

Your Answer: 15   Correct Answer: 15   Correct   Discuss

Q.48. Numerical Type   Award: 2   Penalty: 0   Probability

If a random variable X has a Poisson distribution with mean 5, then the expectation $E\left[(x+2)^2\right]$ equals ___.

Your Answer: 30   Correct Answer: 54   Incorrect   Discuss

Q.49. Numerical Type   Award: 2   Penalty: 0   Databases

In a B+ Tree , if the search-key value is 8 bytes long , the block size is 512 bytes and the pointer size is 2 B , then the maximum order of the B+ Tree is ___

Your Answer: 1   Correct Answer: 52   Incorrect   Discuss

Q.50. Numerical Type   Award: 2   Penalty: 0   Algorithms

A message is made up entirely of characters from the set $X = \{P, Q, R, S, T\}$. The table of probabilities for each of the characters is shown below:

Character	Probability
P	0.22
Q	0.34
R	0.17
S	0.19
T	0.08
Total	1.00

If a message of 100 characters over X is encoded using Huffman coding, then the expected length of the encoded message in bits is _____.

Your Answer: 225   Correct Answer: 225   Correct   Discuss

Q.51. Numerical Type   Award: 2   Penalty: 0   Operating System

Consider the set of process with arrival time (in milliseonds), CPU burst time (in millisecods) and priority (0 is the highest priority) shown below. None of the process have I/O burst time

Process	Arrival Time	Burst Time	Priority
P_1	0	11	2
P_2	5	28	0
P_3	12	2	3
P_4	2	10	1
P_5	9	16	4

The average waiting time (in milli seconds) of all the process using premtive priority scheduling algorithm is _____

Your Answer: 29   Correct Answer: 29   Correct   Discuss

Q.52. Numerical Type   Award: 2   Penalty: 0   Linear Algebra

If the characteristic polynomial of a 3×3 matrix M over $\mathbb{R}$ (the set of real numbers) is
$\lambda^3 - 4\lambda^2 + a\lambda + 30,$ $a \in \mathbb{R}$, and one eigenvalue of M is 2, then the largest among the absolute values of the eigenvalues of M is _____

Your Answer: Correct Answer: 5   Not Attempted   Discuss

Q.53. Numerical Type   Award: 2   Penalty: 0   CO and Architecture

Consider a machine with a byte addressable main memory of 2^{32} bytes divided into blocks of size 32 bytes. Assume that a direct mapped cache having 512 cache lines is used with this machine. The size of the tag field in bits is _____

Your Answer: 18   Correct Answer: 18   Correct   Discuss

Q.54. Numerical Type   Award: 2   Penalty: 0   Programming

Consider the following C program.

```c
#include<stdio.h>
main () {
    int m=10;
    int n, n1;
    n=++m;
    n1=m++;
    n--;
    --n1;
    n-=n1;
    printf("%d", n);
    return 0;
}
```

The output of the program is _____

Q.55. Numerical Type Award: 2 Penalty: 0 Programming

Consider the following C program.

```c
#include<stdio.h>
#include<string.h>
int main() {
    char* c="GATECSIT2017";
    char* p=c;
    printf("%d", (int)strlen(c+2[p]-6[p]-1));
    return 0;
}
```

The output of the program is _____